

GAO

Report to the Chairman, Environment,
Energy and Natural Resources
Subcommittee, Committee on
Government Operations, House of
Representatives

June 1990

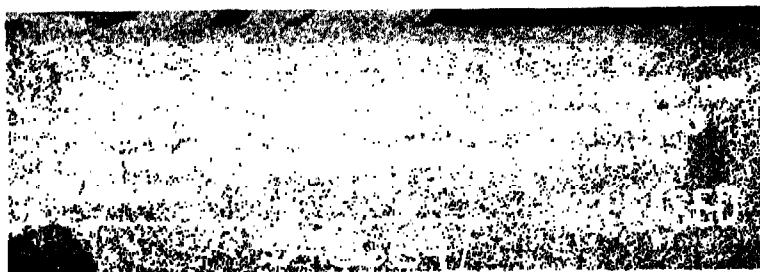
NUCLEAR WASTE

Information on DOE's Interim Transuranic Waste Storage Facilities



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**Resources, Community, and
Economic Development Division**

B-239325

June 8, 1990

The Honorable Mike Synar
Chairman, Environment, Energy
and Natural Resources Subcommittee
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

In your December 20, 1989, letter, you expressed concern that the Waste Isolation Pilot Plant (WIPP)—the Department of Energy's (DOE) planned permanent disposal facility for transuranic¹ (TRU) nuclear waste—may require extensive modifications before it can accept waste. In the meantime, TRU waste will continue to be temporarily stored at six interim sites around the nation.² You noted that continued temporary storage of TRU waste could endanger the environment and that the lack of storage space for newly generated TRU waste could halt production of nuclear weapons.

Because of these concerns, you requested that we provide the Subcommittee with information on (1) the remaining TRU waste storage capacity at DOE interim storage sites and projected dates when capacity will be reached, (2) the existence of any statutory or administrative provisions limiting the amount of waste that DOE can store at existing or proposed interim storage sites, and (3) DOE's alternative plans for stored wastes if delays in the opening of WIPP are extensive or the facility does not open at all.

This report focuses on the TRU waste storage capacity at DOE's six interim storage sites. On February 28, 1990, we issued a report to you and Representative David E. Skaggs on the TRU waste storage situation at DOE's Rocky Flats Plant, located near Denver, Colorado.³ Since 1954, Rocky Flats has stored its TRU waste at the Idaho National Engineering

¹DOE defines TRU waste as any waste contaminated with radioactive elements heavier than uranium at levels greater than 100 nanocuries per gram. (A nanocurie is a billionth of a curie.) Typical waste forms include contaminated glassware, equipment, tools, rubber gloves, paper products, clothing, and soil.

²The six storage sites are located at the Savannah River Site in South Carolina, Hanford Site in Washington, Idaho National Engineering Laboratory in Idaho, Los Alamos National Laboratory in New Mexico, Oak Ridge National Laboratory in Tennessee, and the Nevada Test Site in Nevada.

³Nuclear Waste: Transuranic Waste Storage Limitations at Rocky Flats Plant (GAO/RCED-90-109, Feb. 28, 1990).

Laboratory. However, in August 1989 the Governor of Idaho banned such shipments into the state. Therefore, Rocky Flats has been forced to temporarily store its TRU waste onsite until arrangements can be made to store this waste at other DOE interim storage facilities or place it in WIPP. We reported that, even with the installation and operation of a waste compactor, unless steps are taken to find alternative storage, Rocky Flats could reach its permitted storage capacity in fiscal year 1992.

Results in Brief

We found the following:

- The date that the physical capacity of existing TRU waste storage facilities will be reached ranges from early 1991 at the Hanford Site to about 100 years at the Nevada Test Site. According to officials at the six sites, additional storage facilities are either in the process of being constructed or can be constructed as needed if funds are appropriated and no other restrictions apply.
- Although storage site officials did not identify any statutory restrictions on the amount of TRU waste that can be stored at the sites, certain administrative restrictions could affect storage of TRU waste at some sites. However, if new out-of-state TRU waste, mixed with hazardous waste regulated under the Resource Conservation and Recovery Act (RCRA), is to be stored at the six sites, revised RCRA permits would have to be approved by some of the states. According to DOE storage site officials, the states have indicated that they would oppose the storage of any new out-of-state mixed TRU waste within their borders.
- According to DOE, until WIPP is operational (currently scheduled for 1995), TRU waste will continue to be stored at the interim storage sites. Each interim site is required to develop site-specific waste management plans describing how the projected newly generated TRU waste will be managed until a final disposal site is constructed. In addition, a DOE task force is exploring various options for temporarily storing mixed TRU waste from the Rocky Flats Plant in the event that the onsite capacity at this large DOE production facility is reached. Some of the options being explored by the task force, such as storing waste at Department of Defense sites, could also be used for storing waste from other DOE locations should the need arise.

Background

Under the Atomic Energy Act of 1954, DOE is responsible for managing and disposing of radioactive waste. However, if the radioactive waste is mixed with hazardous waste that is subject to regulation under the Resource Conservation and Recovery Act (RCRA)(42 U.S.C. 6901 et seq.),

this mixed waste is then regulated by the Environmental Protection Agency (EPA) or by EPA-authorized states. At the present time, RCRA regulatory authority for mixed waste varies from state to state. Of those states where DOE interim storage sites are located, four states—Idaho, South Carolina, Tennessee, and Washington—have been granted regulatory authority. Although New Mexico and Nevada operate basic RCRA programs, they are awaiting final EPA authorization to regulate mixed waste. According to DOE, EPA maintains that neither EPA nor the states of New Mexico or Nevada can administer the federal RCRA radioactive mixed-waste program while this authorization is pending. All the sites but Nevada store mixed TRU waste.

Prior to 1970, TRU waste was buried nonretrievably in shallow pits 4 to 20 feet below ground. In 1970, the Atomic Energy Commission (a predecessor to DOE) began storing in a retrievable manner contact-handled and remote-handled⁴ TRU waste at six DOE interim storage sites until DOE decided on a safe, permanent disposal method. DOE estimates that through December 1988 about 191,000 cubic meters of TRU waste was buried and about 59,700 cubic meters was stored at the DOE sites.⁵ In addition, DOE expects to generate an annual average of about 2,535 cubic meters of TRU waste through the year 2013.

In November 1975, DOE identified locations in southeastern New Mexico from which to select a repository site for the permanent disposal of TRU waste. Shortly thereafter, DOE settled on a site about 26 miles from the city of Carlsbad. Subsequent legislation, enacted in December 1979, authorized WIPP as a research and development facility to demonstrate the safe disposal of radioactive waste resulting from defense activities and programs.

Although initially expected to begin operations in 1988, WIPP has been delayed. The Secretary of Energy is scheduled to decide in June 1990 WIPP's readiness to begin a 5-year test program to demonstrate that the waste can be safely disposed of at the site. If the tests show that the waste can be safely disposed of at the site, WIPP could begin operations in 1995.

⁴Contact-handled TRU waste is waste that contains so little radioactive material that it can be handled by workers with the shielding that is provided by the waste package. Remote-handled waste contains high levels of radioactive material and must be handled by remote devices.

⁵Five 55-gallon drums are needed to contain one cubic meter of TRU waste.

Remaining Capacity at DOE Storage Sites Varies

The existing or planned storage facilities at the six DOE sites have the capacity to store an additional 8,700 cubic meters to 9,700 cubic meters of TRU waste. In addition, a second storage facility at the Hanford Site, known as the Central Waste Complex, has space available, as of April 11, 1990, to store about 393 plutonium-equivalent curies (2,562 grams of radioactive material) of TRU waste. However, the remaining storage capacity of facilities at each site and the date this capacity will be reached vary greatly.

According to DOE storage site officials, the existing storage space for contact-handled TRU waste at three of the six sites is beginning to run out. At the estimated storage rates at these sites, DOE will be able to continue to store additional contact-handled TRU waste for 8 months to 31 months at Hanford, Los Alamos⁶, and Savannah River. According to site officials, Oak Ridge could reach capacity in about 5-1/2 years, whereas the Nevada Test Site could continue storing additional unmixed TRU waste for about 100 years. Idaho's remaining capacity, according to site officials, cannot be determined until agreement is reached with EPA Region X on how contact-handled TRU waste is to be stored. Under the worst case storage scenario, according to a site official, Idaho would not have adequate capacity to store waste already at the site. However, if EPA adopts Idaho's recommended storage configuration, the site could continue to store waste for more than 100 years.

Of the four sites storing remote-handled TRU waste (Hanford, Idaho, Los Alamos, and Oak Ridge) only one—Hanford—will reach capacity within the next 14 years, according to DOE estimates. According to Hanford officials, all newly generated remote-handled TRU waste will be stored in drums shielded with lead, thus they can be handled by workers in the same manner as contact-handled TRU waste. The shielded drums of remote-handled waste, according to these officials, will then be stored along with the contact-handled waste at the Central Waste Complex. Hanford officials estimate that the site will reach capacity during the first half of 1991.

According to officials at the six sites, additional storage facilities are either in the process of being constructed or can be constructed, if necessary. However, DOE requires storage sites to perform a safety analysis to demonstrate that storage of waste presents no undue radiological or nonradiological risk to onsite or offsite populations. Only the Hanford

⁶Certified waste storage only (see app. I). Los Alamos should have storage space for its uncertified contact-handled TRU waste for at least 18 years.

Site reported that restrictions have been imposed as a result of such an analysis. According to Hanford officials, operational safety considerations limit the total plutonium content of waste that can be stored at its Central Waste Complex to 520 plutonium equivalent curies. This limit has been established to ensure that the storage facility, classified as a low hazard facility, does not pose an undue risk to onsite or offsite populations. Therefore, although additional physical storage space can be built at the complex, the total radioactivity of the waste cannot exceed the safety limit. (App. I provides a detailed discussion of the storage capacity at each of the DOE sites.)

Restrictions on the Amount of Waste That Can Be Stored

Although storage site officials did not identify any statutory restrictions on the amount of TRU waste that can be stored at the sites, certain administrative restrictions could affect storage of TRU waste at some sites. In addition, these officials said that political opposition to the storage of out-of-state mixed TRU waste must be overcome at all DOE storage sites.

As discussed previously, only the Hanford Site reported that operational safety limits, established as a result of a DOE safety analysis review, restrict the amount of waste that can be stored at one of its two storage facilities. The amount of waste that can be stored at Hanford's Central Waste Complex is limited to 520 plutonium-equivalent curies.

According to DOE site officials, other than DOE-imposed restrictions such as those related to operational safety, no restrictions exist to expanding their storage capacity for unmixed TRU waste. However, TRU waste mixed with hazardous waste is subject to EPA or state regulation. As a result, some storage sites would have to either revise their RCRA interim status permits or obtain approval from the state regulatory agency, or do both, in order to expand capacity beyond the current RCRA permitted limits.⁷ Los Alamos, however, can increase its storage capacity as needed without state approval because neither EPA nor New Mexico are regulating mixed TRU waste while New Mexico is awaiting EPA authorization to administer the RCRA program. According to DOE officials, when New Mexico assumes regulatory authority, the state could establish storage limits that could affect the site's ability to expand capacity. According

⁷The Nevada Test Site waste acceptance criteria does not allow mixed TRU waste to be accepted. The site, also, is not subject to federal RCRA mixed-waste regulations until EPA grants mixed-waste regulatory authority to the state of Nevada.

to an EPA official, it is estimated that the state of New Mexico will have this authority by about September 1990.

Other obstacles could arise if the capacity expansion is necessitated by the receipt of out-of-state mixed TRU waste. Most sites would have to revise their RCRA interim status permits to include the new waste source and obtain state approval before they could accept waste for storage.⁸ However, officials at all DOE sites anticipate state opposition to their storing out-of-state mixed TRU waste.

DOE Contingency Plans If WIPP Opening Is Delayed

Until WIPP is operational, DOE plans to continue storing TRU waste at the DOE interim storage sites. Each interim storage site is required to annually develop a program plan that describes the site's waste management operations and plans for storing waste in the coming fiscal year. According to the Deputy Director, DOE Office of Waste Operations, DOE headquarters would become involved if for some reason a site could not safely store its waste or the site would have to be used to store waste from other DOE facilities, such as the Rocky Flats Plant.

DOE has established the Rocky Flats Plant Alternative Storage Task Force to develop several options to address the mixed TRU waste storage-limit problem at the Rocky Flats Plant in Colorado. The Deputy Director, DOE Office of Waste Operations, said that although the task force is focusing on the Rocky Flats waste, there are no technical reasons why the storage options being explored could not be used for storing waste from other DOE facilities. The options being explored by DOE, in addition to sending Rocky Flats waste to WIPP during the test program, include storage of this waste at DOE interim storage sites, Department of Defense sites, and yet-to-be established commercial TRU waste storage sites. A former task force chairman said that these options will be pursued despite what happens at WIPP because WIPP will take only a small volume of Rocky Flats waste during the early years.

Planning for storage of Rocky Flats' mixed TRU waste at DOE sites has been underway for several months. In addition to possibly storing the waste at the existing six DOE interim storage facilities, DOE is also looking at the possibility of storing the waste above ground at WIPP and expanding the storage capacity at Rocky Flats, if state approval can be obtained. As of May 12, 1990, with the exception of the Rocky Flats

⁸The Idaho National Engineering Laboratory interim status permit already provides for storage of Rocky Flats' TRU waste.

Plant Action Plan, all DOE storage site Action Plans for storing Rocky Flats waste had been approved by DOE, according to the task force chairman. In addition, DOE is revising its draft environmental assessment addressing the environmental impacts associated with each option. If approval of necessary permits can be obtained, DOE believes that some sites could be ready to accept Rocky Flats' mixed TRU waste in 1990. However, according to the Deputy Director, DOE Office of Waste Operations, DOE will not direct the sites to submit RCRA permit modifications until it is absolutely necessary.

A second option that DOE is exploring, with the concurrence of the Secretary of Defense, is the possibility of storing TRU waste on Defense-controlled property. The Defense Sites Subtask Force was formed in January 1990 with representatives from both Defense and DOE. The group will identify potential Defense sites and develop a strategy for site selection. According to the Chairman of the Rocky Flats Plant Alternative Storage Task Force, DOE currently plans to prepare all necessary environmental documentation and to reimburse Defense for all storage costs. A list of potential sites is scheduled to be ready by June 1990. A decision on a viable site will be made in October 1992. The site selected, however, is not expected to be ready to receive Rocky Flats' TRU waste before late 1993.

The last storage option DOE is exploring for Rocky Flats' TRU waste is interim storage at a commercial storage facility. In late February 1990, DOE announced its intention to select a contractor to perform this service. According to the Chairman of the Rocky Flats Plant Alternative Storage Task Force, DOE Secretarial approval of a Request for Proposal is scheduled for May 1990. According to the Deputy Director, DOE Office of Waste Operations, if this approach is approved by the Secretary of Energy, DOE plans to proceed in phases. The first phase would involve feasibility and siting studies. When these studies are completed, the second phase would involve designing the facility and obtaining necessary permits and licenses. The third phase would be the actual construction and operation of a temporary storage facility. DOE estimates that the total procurement would range from \$20 million to \$30 million and that it would take 3 to 4 years before a commercial site could become operational.

Observations

As we reported in December 1989, continued temporary storage of TRU waste at DOE's interim storage sites has become a politically contentious

issue between DOE and the states hosting these facilities.⁹ While some solutions to DOE's interim storage problem may be technically feasible, they may also present political problems. Because there are problems with any storage solution DOE may pursue, we believe that it is important for DOE to determine if WIPP can be used as a repository as quickly as possible.

We conducted our review from December 1989 through April 1990 in accordance with generally accepted government auditing standards. To obtain information on the TRU waste storage capacity and any limitations to increasing the amount of waste that can be stored at each of the six DOE sites, we requested DOE to provide this information in writing along with documentation to support its responses. We then visited the South Carolina, Idaho, and New Mexico sites to verify the information provided to us. For the remaining three sites, we discussed the responses with appropriate DOE and contractor waste management officials to clarify and expand on the responses provided. This report contains information primarily about solid TRU waste storage, since those wastes are targeted for disposal at WIPP. Other TRU wastes (sludges, buried wastes, large bulky wastes) were generally not included. This approach to obtaining the requested information was used in order to respond in a short time frame. We were unable to assess, in depth, the TRU waste management operations or waste minimization activities at the interim storage sites. To determine DOE's alternative storage plans if WIPP were not available, we interviewed officials at DOE headquarters in Washington, D.C. and reviewed DOE's long-range and site-specific waste storage plans.

We discussed the contents of the report with DOE headquarters, operations office, and contractor officials at each of the DOE storage sites, who generally concurred with the facts presented. Their comments have been included in the report where appropriate. However, as you requested, we did not obtain official DOE comments on a draft of this report.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Secretary

⁹Nuclear Waste: Storage Issues at DOE's Waste Isolation Pilot Plant in New Mexico (GAO/RCED-90-1, Dec. 8, 1989).

of Energy and the Director, Office of Management and Budget, and make copies available to others upon request.

Please call me at (202) 275-1441 if you have any additional questions or if we can be of further assistance. Major contributors to this report are listed in appendix II.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Victor S. Rezendes". The signature is written in a cursive style with a large, stylized initial "V".

Victor S. Rezendes
Director, Energy Issues

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Major Contributors to		
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Abbreviations

DOE	Department of Energy
EPA	Environmental Protection Agency
GAO	General Accounting Office
INEL	Idaho National Engineering Laboratory
LANL	Las Alamos National Laboratory
NTS	Nevada Test Site
ORNL	Oak Ridge National Laboratory
RCRA	Resource Conservation and Recovery Act
SCDHEC	South Carolina Department of Health and Environmental Control
SRS	Savannah River Site
TRU	transuranic
WIPP	Waste Isolation Pilot Plant

Current and Future Capacity to Store Transuranic Waste at DOE's Six Interim Storage Sites

The remaining capacity of existing and soon-to-be completed transuranic (TRU) waste storage facilities and the expected date this capacity will be reached vary among the six DOE interim storage sites. However, according to officials at the six sites, additional storage facilities are either in the process of being constructed or can be constructed, if necessary. The following sections discuss the TRU waste-storage situation at each of these storage sites. The variation in the discussion of each site reflects the differences between the sites and site-specific issues.

Hanford Site (Washington)

Hanford currently stores contact-handled TRU waste in a retrievable manner in two facilities—the Transuranic Waste Storage and Assay Facility and the Central Waste Complex. According to a Hanford official, the TRU Waste Storage and Assay Facility is a sturdily constructed building and therefore provides a high limit to the type of waste that can be stored. According to Hanford officials, the Central Waste Complex, on the other hand, consists of several light-weight metal buildings and therefore the DOE Richland Operations Office has approved much stricter storage limits. Because this facility has a low hazard classification, DOE operational safety considerations limit the plutonium content of a drum to 3.6 plutonium-equivalent curies (23 grams of radioactive material) and the total plutonium content of the Complex to 520 plutonium-equivalent curies (3,585 grams of radioactive material).

According to Hanford officials, as of April 11, 1990, the TRU Waste Storage and Assay Facility contained about 252 cubic meters of TRU waste, with a remaining storage capacity of about 83 cubic meters. The other Hanford storage facility, the Central Waste Complex, had an inventory as of April 11, 1990, of about 127 plutonium-equivalent curies of waste (828 grams of radioactive material). Therefore, the Central Waste Complex had a remaining storage capacity of about 393 plutonium equivalent curies of waste.

A DOE Richland official estimates that, if the Waste Isolation Pilot Plant (WIPP) does not open, Hanford's existing onsite TRU waste storage capacity will be reached during the first half of calendar year 1991.¹ According to Hanford officials, when it is apparent that storage space will be exceeded, Hanford could construct additional storage facilities as needed. For example, Hanford is currently planning additional facilities in the Central Waste Complex. The amount of waste that can be stored

¹Newly generated remote-handled TRU waste will be placed in drums shielded with lead and stored in the Central Waste Complex.

within the Central Waste Complex will, however, still be limited to 520 plutonium-equivalent curies.

Hanford officials believe that the 520 plutonium-equivalent curie limit is too restrictive and therefore plan to discuss revising the limit with the Hanford Safety Approval Committee. If the limit cannot be revised, the officials said that the storage space could be maximized by insuring that higher plutonium-equivalent curie waste is placed in the TRU Waste Storage and Assay Facility, thus allowing more waste to be stored at the existing facilities. Another option is to reschedule or delay decommissioning and decontamination activities, thus reducing the amount of waste generated. Other options include (1) placing TRU waste in containers with a greater shielding capability and (2) designing buildings that would have a greater safety limit. Westinghouse, the Hanford site contractor, is expected to complete a study of possible new building designs by the end of July 1990.

Hanford has stored remote-handled TRU waste in a third facility, referred to as the Alpha Caisson facility, or in shallow trenches. The total volume of remote-handled TRU waste stored at Hanford, according to a DOE Richland official, is about 136.5 cubic meters. About 23.5 cubic meters of this waste is stored in the Alpha Caisson facility and the remaining 113 cubic meters of waste is retrievably stored in drums and boxes in shallow trenches covered with dirt. Because the Alpha Caisson facility has reached its storage capacity, all newly generated remote-handled TRU waste will be placed in drums shielded with lead so that it can be handled by workers in the same manner as contact-handled TRU waste. According to a DOE Richland official, this waste will then be stored in the Central Waste Complex.

Idaho National Engineering Laboratory

Since 1970, TRU waste has been placed in interim 20-year retrievable storage at the Idaho National Engineering Laboratory (INEL) Radioactive Waste Management Complex. The Complex includes (1) two fabric-covered buildings, (2) the Intermediate Level TRU Storage Facility for remote-handled TRU waste, and (3) two earth-covered TRU waste storage area pads. Although the current inventory of TRU waste includes both contact-handled and remote-handled waste, greater than 99 percent is contact-handled.

As of February 1990, INEL's inventory of contact-handled TRU waste in the two fabric-covered buildings and in the earth-covered storage pads was about 13,035 cubic meters and 51,720 cubic meters, respectively.

The remaining storage capacity, however, cannot be determined until EPA Region X agrees on a stacking configuration. On January 29, 1990, EPA Region X issued a Notice of Noncompliance to the DOE-Idaho Operations Office stating that the current placement of drums on the storage pads violates RCRA requirements. Specifically, the current dense-pack configuration (i.e., stacking 20 drums wide, 20-25 drums deep, and 5 drums high) does not provide adequate aisle space to allow (1) proper inspection of the drums, (2) unobstructed movement of personnel, or (3) unobstructed movement of emergency equipment.

INEL officials are scheduled to discuss the stacking configuration with EPA by the end of May 1990. According to INEL officials, if INEL is allowed to adopt a modified dense-pack configuration, (i.e., stacking 12 drums wide, 24 drums deep, and 5 drums high), as it has proposed to EPA, INEL would have an estimated remaining capacity of about 1,900 to 2,000 cubic meters. At the current onsite generation rate of about 5 cubic meters a year for contact-handled TRU waste (assuming that no waste will be received from another facility), INEL officials said that storage capacity should be adequate for hundreds of years.

This situation could change dramatically if INEL's proposed modified dense-pack storage configuration is not acceptable to EPA. INEL officials said that if they are required to store TRU waste under the worst-case RCRA stacking configuration (stacking 2 drums wide, 2 drums deep, and 3 drums high), there would not be enough physical storage space in existing facilities to accommodate the contact-handled TRU waste already in storage. According to INEL estimates, if all retrievably stored waste must be restacked using the modified dense-pack configuration, 20 new storage modules would be needed. However, if the worst case RCRA spacing configuration must be used, INEL estimates that 31 modules will be required. According to an INEL official responsible for construction programs at the complex, each module is expected to cost between \$3.5 million and \$6.5 million. (The higher cost figure includes the installation of robotics for monitoring the drums if a modified dense-pack configuration is adopted.)

INEL's remote-handled TRU waste is stored underground in steel pipe vaults at the Intermediate Level TRU Waste Storage Facility. According to an INEL official, this facility has a total physical storage capacity of 136 cubic meters. As of March 28, 1990, INEL had an inventory of 56 cubic meters of remote-handled TRU waste. With INEL's annual average remote-handled TRU waste generation rate of 1.133 cubic meters, INEL could have adequate storage space until the year 2060.

Los Alamos National Laboratory (New Mexico)

The Los Alamos National Laboratory (LANL) generates and temporarily stores both contact-handled and remote-handled TRU waste. According to a draft LANL Waste Management Site Plan, it is estimated that about 40 percent of LANL TRU wastes are also mixed with hazardous waste.

Most TRU waste that has not yet been certified for WIPP acceptance is placed on storage pads in a dense-pack configuration. As the stack progresses down the pad, the top and sides are covered with 3/4-inch plywood, and the entire stack is enclosed with 0.02 inch nylon-reinforced vinyl sheeting. The stack is then covered with 3 to 6 feet of earth to create an artificial mound. On the other hand, TRU waste that has been assayed and certified for WIPP acceptance, according to draft WIPP Waste Acceptance Criteria, is placed on a separate asphalt storage pad under the protective covering of a tension support structure.

As of January 31, 1990, LANL had an inventory of 7,365.5 cubic meters of uncertified contact-handled TRU waste. With a current generation rate of about 8.8 cubic meters of waste per year, according to a LANL estimate, and about 580.5 cubic meters of remaining capacity, LANL should have storage space for its uncertified TRU waste until 2056. However, if LANL was required to restack the waste containers for RCRA spacing requirements, rather than the current dense-pack configuration, LANL could reach storage capacity by the year 2008.

The total inventory of certified contact-handled TRU waste at LANL, as of January 31, 1990, was 304.2 cubic meters. With a current generation rate of about 191.2 cubic meters of waste per year, according to a LANL estimate, and about 543.9 cubic meters of remaining capacity, LANL should have space for its certified TRU waste until about November 1992.

However, the estimated dates that capacity for uncertified and certified TRU waste will be reached is conservative. Specifically, LANL did not factor in the storage savings to be achieved through the use of its Size Reduction Facility in developing its estimates for newly generated waste. This facility is expected to result in a four-to-one reduction in the waste volume. According to a LANL official, the current inventory is now being processed through the Size Reduction Facility, and newly generated waste will be processed beginning later this year.

According to LANL, there are currently no restrictions on the amount of remote-handled TRU waste that can be stored at the site; however, this could change if New Mexico receives regulatory authority as expected

by September 1990. The remote-handled TRU waste is stored in underground shafts. As of March 30, 1990, LANL had an inventory of about 28.4 cubic meters of remote-handled waste. According to a LANL official, 5.4 cubic meters of remote-handled TRU waste will be generated through 1991. Thereafter, they do not anticipate the generation of any additional remote-handled TRU waste that would require storage at the site. Therefore, no additional capacity is needed for remote-handled TRU waste after 1991.

Nevada Test Site

The Nevada Test Site (NTS) currently stores nonmixed TRU waste in 55-gallon drums and boxes in metal sea-land cargo containers on a pad designed and built to RCRA specifications. According to NTS, the Lawrence Livermore National Laboratory is the only facility currently approved to ship TRU waste to NTS for storage.

A total of 210 cargo containers can be placed on the storage pad, providing a total TRU waste-storage capacity of between 1,890 and 3,150 cubic meters, depending on the type of packaging used. According to NTS, as of October 31, 1989, the site had room for an additional 160 cargo containers, which can be used to store between 1,440 and 2,400 cubic meters of TRU waste. The laboratory estimates it will ship about 100 55-gallon drums, or 21.2 cubic meters, of TRU waste to NTS annually. At this rate, if WIPP does not open, NTS does not expect to exceed its current storage-pad capacity for TRU waste for about 100 years.

Oak Ridge National Laboratory (Tennessee)

Since 1970, the Oak Ridge National Laboratory (ORNL) has stored most of its solid TRU waste in a retrievable manner in various facilities in the north area of what is known as Solid Waste Storage Area 5. According to ORNL officials, 70 percent of the solid TRU waste is considered contact-handled TRU waste because of its low radiation level. Therefore, about 30 percent of the stored solid TRU waste inventory contains enough radiation to require remote handling. According to ORNL officials, almost all of the ORNL TRU waste is considered mixed waste under the current EPA guidelines.

ORNL currently stores contact-handled TRU waste in two buildings. Because these buildings do not have a concrete pad and are partially buried, they are not in compliance with RCRA or DOE storage facility requirements and therefore must be vacated by November 1992. According to ORNL, construction is scheduled to begin in October 1991 on a \$1.05 million storage facility to replace these two buildings. When

**Appendix I
Current and Future Capacity to Store
Transuranic Waste at DOE's Six Interim
Storage Sites**

completed, the new facility will provide storage space for about 594 cubic meters of contact-handled TRU waste. However, as of October 31, 1989, ORNL already had about 510 cubic meters of contact-handled TRU waste in storage that must be transferred to the new storage facility. ORNL projects that the remaining capacity at the new facility will provide adequate space to store newly generated contact-handled TRU waste (about 13.8 cubic meters annually) through December 1995.

According to the ORNL Project Manager/Waste Management, the total volume of remote-handled TRU waste retrievably stored at ORNL is about 222 cubic meters. This waste is stored in concrete casks in a bunker-type facility or in shallow trenches.² However, according to ORNL, the shallow trenches do not meet state or federal requirements and must be vacated by November 1992.

ORNL plans to construct two new remote-handled TRU waste storage facilities to replace the shallow trenches and to provide additional storage capacity for newly generated waste. According to the ORNL Project Manager/Waste Management, construction will begin on the first storage facility in August 1990. This \$940,000 facility will have a capacity to store 108 concrete casks. The forecasted date to start construction for the second storage facility is July 1992. This \$900,000 storage facility will provide storage space for 162 concrete casks of remote-handled TRU waste. With the addition of the two new facilities, ORNL will have a remaining remote-handled TRU waste storage capacity of about 88 casks. At a generation rate of about 4.59 cubic meters a year, ORNL will not reach its remote-handled TRU waste storage capacity until June 2004.

Savannah River Site (South Carolina)

According to Savannah River Site (SRS) officials, all TRU solid waste, generated as a by-product of production since 1974, is stored on concrete pads at SRS within a 119-acre area. Depending on the waste involved, several different types of waste containers can be placed on the pads. TRU waste containing greater than 100 nanocuries per gram but less than 0.5 curies per container is stored directly on the pad in 55-gallon galvanized steel drums. Galvanized steel drums containing waste greater than 0.5 curies per container are first placed in prefabricated concrete containers, called culverts, and then placed on the pads. Finally, large, bulky TRU waste, such as decommissioned equipment, is placed in carbon steel boxes before placement on the pads.

²According to ORNL, for purposes of this report, the volume of the cask is equal to approximately 1 cubic yard, or 0.765 cubic meters.

**Appendix I
Current and Future Capacity to Store
Transuranic Waste at DOE's Six Interim
Storage Sites**

According to Savannah River officials, as of May 8, 1990, TRU waste stored at SRS was equivalent to about 12.5 of the 13 existing RCRA-permitted storage pads. This excludes TRU waste equivalent to about 0.5 storage pads that is being stored temporarily at the generators until completion in June 1990 of 4 new RCRA-permitted storage pads. Therefore, when the new TRU pads are completed, SRS will have approximately 4 TRU pads to store newly generated TRU waste, excluding waste generated since May 8, 1990. Using SRS' projected annual waste generation rate of about 992 cubic meters of mixed and TRU waste and about 857 cubic meters of large, bulky TRU waste, the remaining storage capacity at SRS is about 3,900 cubic meters. We estimate, and an SRS official in Waste Management and Technology agrees, that capacity could be reached at its existing and soon-to-be-completed TRU storage pads by July 1992.

The waste storage situation at SRS, however, could deteriorate if the current spacing of storage containers must be changed. On July 13, 1989, the South Carolina Department of Health and Environmental Control (SCDHEC) waived the state's requirement to maintain aisles between the stored drums to allow unobstructed movement of equipment to any area of the facility. The waiver was granted on the condition that the stored drums contained no free liquids. Although SRS records indicate that SCDHEC was notified as early as March 24, 1989, that rainwater had intruded into the drums, no action has been taken by the state to require SRS to provide wider aisles. According to an SRS official, as long as SRS is making a good faith effort to remove the water from the drums, the state will not require wider aisle spacing. He said that a contract to remove the water from the drums is expected to be awarded in June 1990. If SCDHEC were to require wider aisles between the drums, SRS' remaining storage capacity would be significantly reduced.

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